

## Assignment 3-2 Polynomial Multiplication 1

You are given two polynomials  $f(x)$  and  $g(x)$  with integer coefficients. In this problem you'll have to find out the product  $f(x) \cdot g(x)$  of  $f(x)$  and  $g(x)$ . For the sake of convenience, we define the zero polynomial as  $0x^0$ .

### Input

The input consists of  $t$  ( $30 \leq t \leq 40$ ) test cases. The first line of the input contains only positive integer  $t$ . Then  $t$  test cases follow. Each test case consists of two lines which give the two polynomials  $f(x)$  and  $g(x)$ . The polynomials are represented by first an integer  $d$  ( $0 \leq d \leq 100$ ) which represents the degree of the polynomial, followed by  $d+1$  integers (in the range  $[-999, 999]$ ) representing the coefficients of the polynomial. The coefficients are in decreasing order of exponent, and the leading coefficient is not 0. You may assume that neither  $f(x)$  nor  $g(x)$  is the zero polynomial.

### Output

For each test case, you are to output a single line containing  $f(x) \cdot g(x)$ , in the same format as the input.

### Sample Input

```
1
3 1 -2 0 -4
1 1 -3
```

### Sample Output

```
4 1 -5 6 -4 12
```

### Suggested data structure

In your program, it is suggested that a polynomial  $a_n x^n + a_{n-1} x^{n-1} + \dots + a_2 x^2 + a_1 x + a_0$  is represented by the following array:

$n$	$n-1$	$\dots$	2	1	0
$a_n$	$a_{n-1}$	$\dots$	$a_2$	$a_1$	$a_0$

That means the coefficient of the  $x^k$  term is stored in location  $k$  of the array. For example, the polynomial  $-x^3 - 2x^2 + 4$  is represented by the following array:

3	2	1	0
-1	-2	0	4

Note that the coefficients can be 0.

## Suggested part of the program

You are suggested to write the function `multiplication` to complete the following program which solves this problem. It is also suggested that you don't declare arrays (or vectors) in the function `multiplication`, and don't declare global variables (including global arrays) except `arraySize`.

```
// Polynomial multiplication
#include <iostream>
using namespace std;

const int arraySize = 101;

// product = multiplicand * multiplier provided that
// neither multiplicand nor multiplier is the zero polynomial
void multiplication( int multiplicand[], int multiplier[], int product[],
    int multiplicandDegree, int multiplierDegree, int &productDegree );

int main()
{
    int T;
    cin >> T;
    for( int t = 0; t < T; t++ )
    {
        int multiplicand[ arraySize ];
        int multiplicandDegree;
        cin >> multiplicandDegree;
        for( int i = multiplicandDegree; i >= 0; i-- )
            cin >> multiplicand[ i ];

        int multiplier[ arraySize ];
        int multiplierDegree;
        cin >> multiplierDegree;
        for( int i = multiplierDegree; i >= 0; i-- )
            cin >> multiplier[ i ];

        int product[ 2 * arraySize ];
        int productDegree;
        multiplication( multiplicand, multiplier, product,
            multiplicandDegree, multiplierDegree, productDegree );

        cout << productDegree;
        for( int i = productDegree; i >= 0; i-- )
            cout << " " << product[ i ];
        cout << endl;
    }
}

// product = multiplicand * multiplier provided that
// neither multiplicand nor multiplier is the zero polynomial
void multiplication( int multiplicand[], int multiplier[], int product[],
    int multiplicandDegree, int multiplierDegree,
    int &productDegree )
{

}
```